

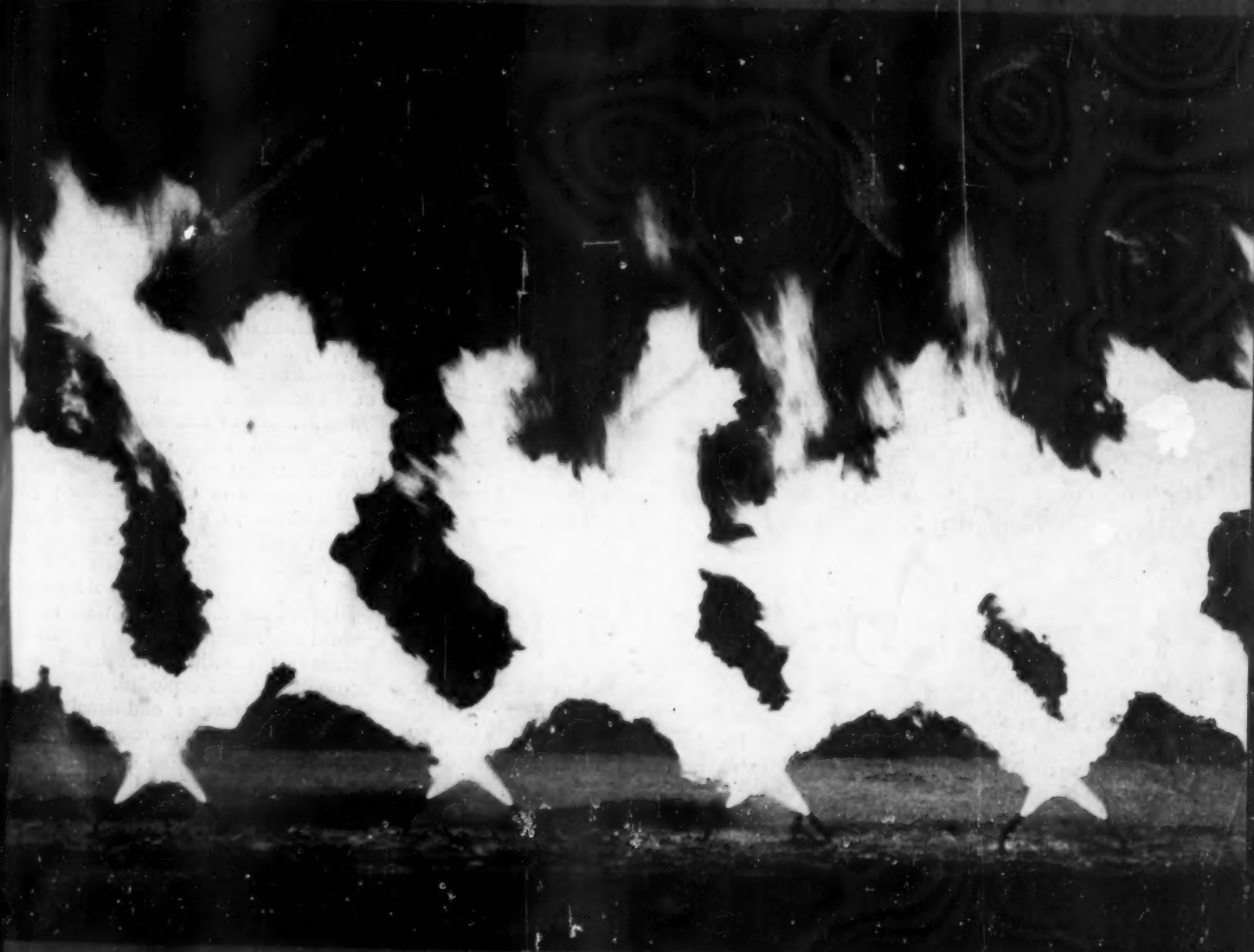
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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • JANUARY 11, 1947



Fog Dispersal

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ASTRONOMY

Red "Coronium" Line in Sun

Findings indicate that the sun has regions of higher energy than suspected and may mean that gases are bubbling up from sun's interior.

► A NEW CHAPTER in one of the major astronomical mysteries was written when the American Astronomical Society was told that the red "coronium" spectrum line of light has been found in the sun itself, indicating that the sun has regions of much higher energy than previously suspected.

The researches of Dr. Leo Goldberg, this year named director of the University of Michigan Observatory, detected the broad and fuzzy absorption line of the solar disk that is identical with one of the most characteristic lights of the filmy, beauteous corona of the sun seen only during natural or artificial eclipse of the sun.

Discovery of this line and prominent green lines at solar eclipses in the last century caused astronomers to believe that a chemical element they named coronium existed only in the heavens and not on earth. Not until 1940 did Dr. Bengt Edlen, Swedish astronomer who attended this meeting, prove that the strange element was really common earth substances, iron, nickel and calcium, in

highly excited states.

Discovery in the sun of the absorption line of iron from whose atoms nine electrons have been stripped is confirming incidental proof that there is no mysterious coronium.

Dr. Goldberg's findings, made in cooperation with Drs. R. R. McMath and O. C. Mohler of the McMath-Hulbert Observatory, may mean that gases are bubbling up from the sun's interior into its bright outer envelope.

Ships and planes making their way into polar regions will know their location more exactly because of research being conducted by Dr. Charles H. Smiley of Brown University. Measurements during the past three years of the flattening of the sun near sunrise and sunset have laid the groundwork for tables showing how much observations of moon, planets and stars near the horizon must be corrected because of atmospheric refraction. Arrangements have been made to observe sunrise and sunset at all latitudes from the tropical to the frigid zone.

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MEDICINE

Hemoglobin Aids Penicillin

► HUMAN BLOOD'S red coloring chemical, hemoglobin, makes penicillin a better weapon against stubborn infections in wounds and burns, Dr. Felix Jansey of Northwestern University Medical School reported to the American College of Surgeons.

The hemoglobin is obtained in the form of a sticky powder from blood or red blood cells discarded from blood and plasma banks. This is mixed with the penicillin and kept in the refrigerator until the surgeon needs it.

The advantage of using hemoglobin with penicillin is that this red color chemical from blood keeps a higher concentration of penicillin in the wound for a longer time than can be kept with any other method of giving penicillin. Since it comes from blood itself, the material

is not irritating and does not cause any foreign-body reaction.

Dr. Jansey first tried this method in two Army hospitals in England during the war. It was for soldier patients whose infected wounds resisted every form of treatment, including injected penicillin. The laboratory reported that the germs causing the trouble were the kind penicillin could destroy if the mold chemical was given in high concentration. But when given by injection, penicillin concentration in the blood is less than one percent and that was not enough to kill the germs. So Dr. Jansey, then Lt. Col. tried sprinkling the penicillin-hemoglobin mixture into the wounds and got good results.

Just recently released from the Army, he has not had a chance yet to try this

mixture in accidental wounds of civilian life. He feels sure it will be effective, but he does not advise using it in all wounds, since the great majority will heal without it. The mixture should be reserved for wound infections that will not clear up with other treatments.

Possibility of giving the hemoglobin-penicillin mixture by injection, to prolong the effect of the penicillin, is one Dr. Jansey hopes to explore in the near future.

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ZOOLOGY

Bikini Ships House Animals For Scientific Research

► THE GHOST ships of Bikini, still "hot" with radioactivity from the atomic bomb of July 25, now have animal "crews" aboard in order that science may know the medical effects of the atoms that are still exploding.

Capt. Rupert H. Draeger, U.S.N., of the Naval Medical Research Center, Bethesda, Md., who had charge of animal tests at the two bomb explosions, has returned from a return trip to Bikini atoll, by air, where he set up a new experiment to determine the danger of residual effects of atomic bomb explosions.

Installations of animals were made in cages aboard the ships so that they will be exposed to the artificially radioactive portions of the ships. Navy personnel in charge will visit the ships for a short time each day to feed and care for the experimental animals and observe what happens. It would be too dangerous for the medical men to live aboard the contaminated ships although almost six months have passed since bomb Baker was exploded.

At Kwajalein an additional set of experiments is in progress. Portions of the ships were removed and transported to that island to allow the convenience of dry land operation. The radiations to which more animals are subjected are provided by these still-active specimens from the target ships.

Weather is bad at Bikini now, Dr. Draeger told the American Association for the Advancement of Science session to which he and Dr. Shields Warren of Harvard Medical School reported the results of the effects of atom bombs on animals. The trade winds blow strongly, making it difficult to house the experimental animals safely and securely aboard the test ships.

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BIOLOGY

AAAS Meeting Prize Split

Two researches in biology win the \$1,000 prize for Drs. Q. M. Geiman and R. W. McKee, and Dr. T. M. Sonneborn and associates.

► THE TWO researches in biology that have split the annual \$1000 American Association for the Advancement of Science prize might be titled (by a "who dunnit" writer):

"Blood Sacrifice For Malaria Germs."

"Chemical Murder Among the Paramecia."

Dr. Q. M. Geiman and Dr. R. W. McKee of Harvard University, winners of half of the award, did use their own blood in their investigations that promise to lead to advances in understanding other blood parasite diseases as well as malaria.

Breeding microscopic one-celled water animals of a special kind that can commit chemical murder was involved in the prize researches at Indiana University conducted by Dr. T. M. Sonneborn, with the cooperation of Misses Ruth V. Dipell and Winifred Jacobson.

Malaria Combatant

The research that won their share of the prize for Drs. Geiman and McKee was born of the wartime search for more effective ways to combat malaria. During the war, numerous scientists had sought a method that would make malaria germs grow outside a human or animal body, in laboratory flasks or test-tubes. These were only partially successful, but advances were made nevertheless.

Beginning just a year ago, the Harvard team made final improvements that made it possible to substitute a synthetic fluid for blood serum in which the red corpuscles that housed the malaria germs could float and find nearly normal nourishment. This contained crystalline albumin, glucose, sodium acetate, glycerol, para-aminobenzoic acid and other vitamins, and all known amino acids. Of the latter, methionine is most essential.

In this semi-artificial blood the germs of a monkey malaria lived and grew. That they were normal in their ability to cause malaria was proved by injecting some of them into healthy monkeys, which presently became sick.

It was also possible to cultivate the germs of human malarias, particularly the vicious vivax type, in an earlier-type

nutrient fluid in which human blood serum was used. The two experimenters sacrificed blood from their own veins for this purpose, and also "tapped" some of their laboratory associates. On the germs thus cultivated, new antimalarial drugs were tested in glass vessels, and the results confirmed by subsequent tests on actual malaria patients.

Drs. Geiman and McKee hope to see their technique developed to a point where it can be used in the study of other diseases caused by blood parasites, such as African sleeping sickness.

Paramecium Murderers

Dr. Sonneborn has been working for ten years on the problem on which he and his feminine fellow-scientists received half of the prize. The most spectacular phase, and the one on which he and his teammates presented three papers at the meeting, has to do with the development of a line of hereditary chemical murderers in carefully bred cultures of the microscopic one-celled water animal known as paramecium.

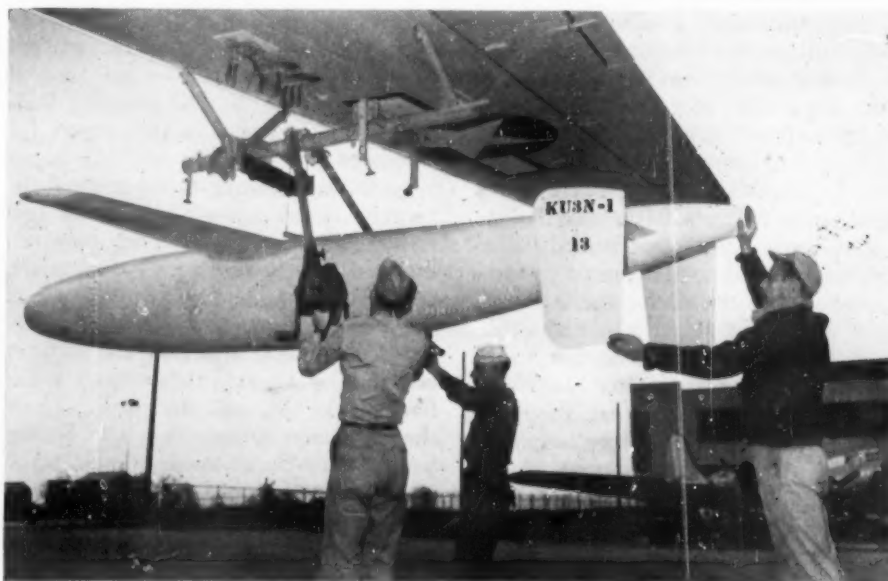
This hereditary line secretes an antibiotic compound that kills paramecia of any other strain that comes into contact with it in the water. He has named this substance paramecin. Several strains are able to produce paramecin in varying strengths, but one seems to be dominant over all the others in deadliness—regular paramecium prussians.

Paramecin production depends on a factor in the general cell-protoplasm of the paramecian body, which Dr. Sonneborn has designated with the Greek letter kappa. This belongs to the peculiar class of cell-substances termed plasmagènes. Kappa is under the biological orders of a "regular" gene in the nucleus, which Dr. Sonneborn calls K. Unless both are present, neither can act, and no paramecin is secreted.

Although kappa and all other plasmagènes are ruled by their respective nuclear genes, they are not produced by them. Only when cell-protoplasm, or cytoplasm, containing them is passed on from one generation to the next in reproduction are more plasmagènes produced.

The paramecin generated by this K-kappa combination is extraordinarily poisonous to non-resistant paramecia. One particle of it, perhaps only one molecule in size, is able to kill.

The paramecia that produce paramecin are themselves resistant to its action. But they can be made to lose this immunity. If they are kept at a tempera-



REMOTE CONTROLLED—KU3N-1 is an air-to-ground missile, launched from under the wing of its parent airplane and flown by remote control from another plane. This missile can reach its target at speeds greater than 500 miles per hour. Official U. S. Navy Photograph.

ture between 32.8 and 34.2 degrees Centigrade, kappa ceases to multiply and produce paramecin. After a time, the now non-productive strain becomes sensitive, and can be killed by the paramecin of its still-virulent sibling cells.

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ENGINEERING

Guided Missile Research Computed from 1,200 Miles

► BUFFALO, New York, is 1,200 miles from Daingerfield, Tex., but when an engineering problem arises, it takes only a few seconds to cover the distance.

Guided missile models are being tested at supersonic speeds in a wind tunnel at the Lone Star Laboratory in Daingerfield. When peak loads of data from the missile studies threaten to bottleneck work in the Texas laboratory, the data are teletyped to the Cornell Aeronautical Laboratory. The computations are sent back by teletype when completed.

This long distance computation service is a part of guided missile research work being carried on by the Johns Hopkins University Applied Physics Laboratory for the Navy Bureau of Ordnance.

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PLANT PHYSIOLOGY

Microscopic Plant Sheds Light on Photosynthesis

► A MICROSCOPIC plant has given new information of possible significance in the still-unsolved puzzle of what green plants first make when they use sunlight and carbon dioxide to form food. Some scientists have claimed it is glucose, others say it is starch.

Prof. Jack Myers of the University of Texas used in his experiments the microscopic one-celled plant named *Chlorella*, he reported to the meeting of the American Association for the Advancement of Science, which can make food like any other green plant but which also has the peculiar animal-like ability to use ready-made food at the same time. He measured its ability to oxidize glucose in the dark, then in short daylight periods when it was making food. He found that the rates were the same in both instances. Hence he concludes that in this plant, at least, the first food made is not glucose but starch.

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American railroads employ over 1,375,000 persons.

GENETICS

Mouse Mutation Speeded

Methylcholanthrene produces evolutionary changes in mice. Changes were made in color of body and speed-up in the rate of mutations.

► EVOLUTIONARY changes in mice produced by a chemical compound, methylcholanthrene, were announced before the meeting of the American Association for the Advancement of Science by Dr. L. C. Strong of Yale University School of Medicine.

Chemistry thus joins physics, as represented by X-rays, radium radiations, ultraviolet rays and heat, all of which have been successfully used during the past quarter-century in speeding the production of those sudden evolutionary jumps known as mutations. For pioneer work of this kind with X-rays, Dr. H. J. Muller of Indiana University recently received a Nobel prize.

In his experiments Dr. Strong used three strains of uniformly brown-coated mice, which by the end of the research reported to the meeting had been inbred for twenty-five generations. The chances of their being of non-uniform heredity he therefore holds to be minimized.

After Dr. Strong had satisfied himself of the genetic dependability of his mouse strains, he began injecting doses of the chemical, and watching for signs of hereditary change, particularly in the direction of cancer production. He selected among the progeny for mice that showed cancer resistance. Several breeding lines showed improvement in this respect for a number of generations but then began to backslide, reverting to the original degree of cancer susceptibility in a few more generations. One line, however, kept the gain in resistance it had made, and still has it.

Other mutations thus chemically produced included change from the uniform brown color all over the body to a different color on the underside. These changes range from what Dr. Strong termed "pale black" to cream-color. Some of the lines developed spotted coats, and at least one strain now has white ears.

Most striking of the results would appear to be the rate of mutation, which was greatly speeded by the chemical.

Use of a group of chemical warfare agents, the nitrogen mustards, for producing mutations has recently been reported. However, Dr. Strong stated, the

effects of these chemicals more nearly resemble those of physical agents.

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The battle against insect pests will long continue because they seem to be able to adapt themselves to new environments and to develop a resistance to control measures.

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RADIO

Wavelength Carries Voice, Radiotype Message Together

► THE SAME wavelength can carry the human voice and a radiotype message at the same time by a dual-purpose radio system, an invention of Walter S. Lemmon, president of the World Wide Broadcasting Foundation.

It is an important development because demands for the wavelength channels used in ordinary broadcasting are far greater than the number of bands available. With the new device, short-wave transmitters are used. Using the same wavelength for two transmissions doubles the capacity of the air.

A crystal device at the transmitter changes very slightly the wavelength of one of the messages using the same wave. It is said to "split" the wave. It is put in the transmitter in place of the ordinary crystal. The voice and the radiotype messages travel together but independent of each other.

At the receiving ends, either at the same location or far separated, a short-wave receiving set, fitted with a special electronic attachment, can be tuned to pick up one message or the other, eliminating the one not wanted.

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MEDICINE

Instrument Aids Surgeons In Removing Skin

► SURGEONS removing skin from the human body to graft elsewhere will be aided by an improved instrument which enables them to see at all times just how the device is operating. The instrument, called a dermatome, has a semi-cylindrical drum that rotates over the surface of the person at the point where the skin is being removed. By means of an adhesive on the drum, the skin is lifted as the drum revolves so that it can be safely severed by a sharp cutting edge fixed in the instrument to follow the drum.

In the improved device, a mirror is attached to the framework behind the cutting blade holder at the proper angle so that the surgeon can see under the drum where the blade is in operation. Patent 2,413,354 was awarded for this device to John A. Jenney, Flushing, N. Y.

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RADIOTYPE MACHINE—The dual system of broadcasting is demonstrated by Walter S. Lemmon, right, inventor.

EVOLUTION

Egg Came Before Chicken

Production of hard-shelled egg was important step in evolution. It enabled reptiles to lay eggs on land and evolve the stocks that produced mammals and birds.

► THE EGG did come before the chicken, Prof. Alfred S. Romer of Harvard University told an audience of fellow-scientists at the Conference on Genetics, Paleontology and Evolution held in connection with the celebration of Princeton University's Bicentennial.

Production of hard-shelled eggs was a most important step in evolution, Prof. Romer pointed out. It enabled reptiles, which pioneered in this innovation, to lay their eggs on land, and thus freed them from dependence on water, necessary for the thin-shelled, more perishable eggs of amphibians and fishes. Free to rove the land at will, reptiles could go ahead and evolve the stocks that eventually produced mammals and birds—among them, the chicken.

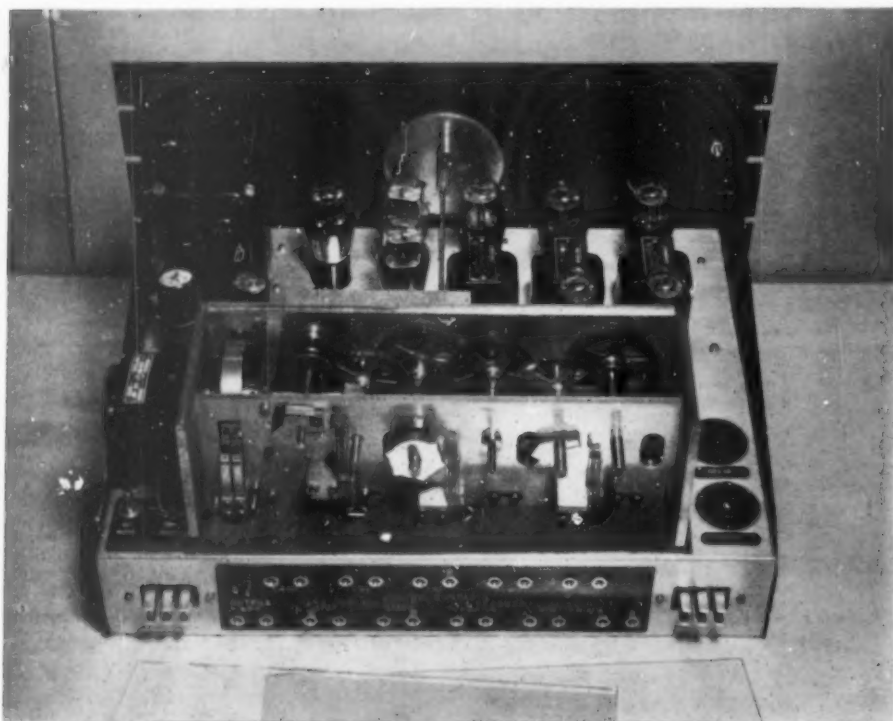
The speaker cited this as an example of preadaptation—the production of characters or organs by evolving animals in advance of the use to which they were subsequently put. It is not so much that such made-in-advance evolutionary changes anticipate their eventual uses, he explained, as that they give an immediate advantage under existing conditions, and keep it, perhaps even extending it, when conditions change.

As other examples, Prof. Romer mentioned lungs and legs. These organs usually thought of as belonging primarily to land animals actually had their beginnings in fishes. Present-day tropical lungfishes make little or no use of their gills, but gulp air from the surface into primitive lungs. Land animals have merely kept and improved on these ancient pristine inventions.

England's majestic oaks are really more American than English. Oaks with broad, lobed leaves, like the familiar white, black, scarlet and bur oaks, evolved mainly on this continent, said Prof. R. W. Chaney of the University of California.

The original ancestral oaks, that lived in Cretaceous geologic times, during the declining days of the dinosaurs, had thickish, smooth-edged leaves like those of the present-day live-oaks of the South and Southwest. In the earlier part of the age of mammals, new Cretaceous oaks arose with toothed or wavy margins on their somewhat larger leaves. Not until Miocene time a little after the middle of the age of mammals did full-fledged, full-sized, deeply lobed oak leaves of the present-day type grow on trees.

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HELPING IT TICK—Rear view of the National Bureau of Standards seconds pulse generator and time interval selector used in the time control equipment of the Bureau's radio station WWV.

PHYSICS

Crystal Clock Broadcasts

National Bureau of Standards uses crystal clocks with electronic circuits to tell time to the world in only service of this kind.

► THE WORLD'S only continuous time signal service uses crystal clocks with electronic circuits to answer the question, "What time is it?" with accuracy down to a millionth of a second.

The crystal clocks' scientific time-keeping is broadcast throughout the world from the National Bureau of Standards radio station, WWV Beltsville, Md. If you think your watch is keeping accurate time, you can check it with the Bureau's shortwave time signals 24 hours a day on one or more frequencies.

A flawless crystal of quartz with series resonance of approximately 100,000 or 200,000 cycles per second is the heart of the clocks. Electron-tube circuits oscillate the crystal continuously, and the resulting frequency is divided into 60 cycles per second with no loss of accuracy.

Automatic announcement equipment

for the time broadcasts at intervals of one minute, five minutes and 30 minutes comes from a synchronous motor powered by the 60-cycle frequency. The motor, through gear trains, drives the contacts which control the time interval announcements.

A highly accurate seconds pulse is broadcast using a one-second contact which opens an electrical gate. These pulses are determined by the crystal oscillator frequency which has an accuracy within a few parts in 100,000,000. Phase shifts and other difficulties cause the actual broadcast second to slip to an accuracy of one microsecond, one-millionth of a second.

Conditions affecting the accuracy of the quartz crystal of the clock include temperature, pressure and humidity. The pressure and humidity are kept constant by sealing the quartz plate in a metal or glass enclosure, while the plate and cer-

tain important parts of the circuit arrangement are put in a constant-temperature oven.

Two important differences between the electronic crystal clock and the conventional pendulum clock are the fact that changes in the gravitational constant do not affect the crystal clock's accuracy, and it is possible to compare crystal clocks at high frequencies to determine erratic behavior accurately. Equipment used to compare the clocks will accurately note a difference equal to one second in 50 years. Differences between absolute time and the broadcast time signals are constantly being checked by the Naval Observatory.

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MEDICINE

Radium Aids Hearing In Adenoid Defect Cases

► A NINE-YEAR-OLD boy was failing in school. He had a speech defect and was thought to be mentally defective. His identical twin brother was leading the first division of his class in school. The dull child had not had any ear trouble, but at times his family felt he had some deafness. He had had his tonsils removed and two operations for adenoid removal.

Examination showed a mass of adenoid tissue which had completely overgrown the Eustachian opening and an abnormal condition of the ear drum. Another operation for removal of the adenoid tissue did not improve his hearing.

He was then given radium treatment and within six months there was not only improvement in his hearing, but his speech defect had disappeared and he was with his twin in the first division of his class.

This dramatic case history was reported to the American College of Surgeons by Dr. John E. Bordley, of the Johns Hopkins Medical School, to illustrate the results that can be obtained with the use of radium in conductive deafness due to obstruction of the pharyngeal end of the Eustachian tube with lymphoid or adenoid tissue.

This method is not effective in other forms of deafness. It is more effective when started early and best results are obtained in children.

No single serious reaction has followed any of the thousands of these radium treatments given at Hopkins nor any of the 14,000 given in the Army Air Forces aerotitis control program.

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GENERAL SCIENCE

Science Foundation Urged

American Association for the Advancement of Science adopted policy calling for federal authorization of a National Science Foundation.

► CONGRESS is to be informed by a new inter-society committee of scientists that the scientific world is solidly behind the creation of a National Science Foundation.

The most important action of the American Association for the Advancement of Science annual meeting held at Boston was the unanimous adoption of policy statements that called for the federal authorization of a National Science Foundation "to support fundamental scientific research and the education of scientists" as of "the utmost importance for the health, security and welfare of the nation."

Every scientific organization of national scope is to be asked to join with the AAAS in forming the foundation committee. Thus there will be created a body of about 200 scientists and educators willing to advise the Congress on the details of what should be done.

There has been wide support in scientific circles and in Congress for some sort of National Science Foundation and the most favored bill, S. 1850 of the 79th Congress, passed the Senate and died in House committee.

Considerable differences on details did develop which resulted in various groups backing different bills. Whether this will happen in the new Congress remains to be seen.

Some scientists wanted the foundation organized under an administrator and others favored a part-time board of scientists to have control. Some favored pat-

ent rights in any discoveries to be dedicated to the public or held by the government while others wanted commercial rights to be left with the scientists who made the discoveries. Because the grants of federal money under the proposed foundation would be for pure or basic research to develop knowledge of a fundamental character, it is argued that the patent question actually is of little importance.

The new committee may be able to settle such differences. One basic study stressing the need of a science foundation was the report that Dr. Vannevar Bush made to President Truman in July, 1945. Another was the report of the Senate Committee on Military Affairs in April, 1946, resulting from extensive hearings under Senator Kilgore, D., W. Va.

It seems likely that a new bill reconciling various points of view may be prepared and introduced under Republican auspices. In Boston discussions it was reported that Dr. Bush might now be willing to agree to a foundation under an administrator rather than the board that his report recommended. This would resolve one past conflict.

Both Army and Navy have been on record in the past favoring a civilian science foundation, and extensive Navy research grants to colleges in the past year are considered by its spokesmen as evidence that future national defense needs such basic inquiries urgently.

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ASTRONOMY

Sun Gas Speed Calculated

► MANY NEW facts about gigantic eruptions upon the sun will be discovered through use of a new tunable filter announced for the first time by Dr. Bruce H. Billings, Research Laboratories of the Polaroid Corporation.

The speed with which gases, rising from the sun in the form of prominences, move toward us and the actual position of these prominences in relation

to the sun can be calculated with this instrument, Dr. Billings told members of the American Astronomical Society meeting jointly with the astronomy section of the American Association for the Advancement of Science.

The filter, designed for use at the High Altitude Observatory of Harvard University and University of Colorado at Climax, Colo., makes it possible to

use electrical controls to tune out all except the desired wave length. The active elements of the filter consist of a series of plates of a crystal of high electro-optic coefficient which are paired with the customary filter elements. The pass band can be shifted in a fraction of a millisecond.

The filter was designed for use in studying that component of the motion of solar prominences which lies along our line of sight. In use it would be combined with a Lyot type coronagraph. By noting the amount certain identifying spectral lines are shifted, the speed with which the various gases forming the prominence move toward or away from us can be determined.

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CHEMISTRY

Stable Organic Compounds Reduced by New Chemical

► HIGHLY STABLE organic compounds are easily reduced by a new chemical, discovered in 1945 but just revealed. They yield to it at room temperature and at normal pressure. It is lithium aluminum hydride.

This chemical, that promises to become a universal reducing agent for organic compounds, has now been reported to the American Chemical Society by Prof. H. I. Schlesinger and A. E. Finholt of the University of Chicago who discovered it while engaged on a project for the U. S. Naval Research Laboratories.

The chemical is easily prepared from lithium hydride and aluminum chloride. It is a white crystalline solid readily soluble in ether, the solvent in which most of its reduction reactions are carried out. It has been successfully applied to the reduction of aryl nitro compounds to the azo acids, nitriles to primary amines, and ketones, esters, aldehydes, anhydrides, and acid chlorides to their corresponding alcohols.

The new chemical will prove useful in inorganic work also. It has been used to prepare other metallic hydrides, some of which have never before been obtained in large quantities. It affords a direct method for replacing a halogen atom with a hydrogen so that such compounds as alkyl silanes can be prepared directly from alkyl silicon chlorides.

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Color in stained glass is obtained by including very small amounts of metallic oxides in the mix.

AERONAUTICS

Two Living Men Ejected From Fast Flying P-61

► TWO LIVING men have already been safely shot from a P-61 airplane flying at approximately 300 miles per hour in tests of the Army's ejector for enabling pilots to clear jet aircraft in emergencies, Dr. Henry M. Sweeney, chief of the biophysics branch of the Aero Medical Laboratory at Wright Field, revealed at the meeting of the American Association for the Advancement of Science.

A pilot must leave the cockpit at a velocity of approximately 60 feet per second to clear the tail of our aircraft at full speed. Information gained shortly after V-E Day on German methods of ejecting men from jet aircraft could not be applied completely as our aircraft had a central vertical stabilizer on the tail, rather than a split tail, and traveled at a greater speed.

Rocket power and compressed air were considered for the propelling force but powder charges were finally selected because of smaller weight and less area of vulnerability to enemy gunfire.

The gun now in use is three feet in tube length but develops a five-foot stroke by its telescopic action. Arm rests on the pilot's seat are used to reduce the force applied to the lower part of the spine resulting from the acceleration during ejection. The seat cushion is reduced to a minimum and the pilot must assume proper posture for safe ejection. The tests Dr. Sweeney reported showed that under these conditions a 45-foot per second velocity charge developing from about 12 g on the seat to as high as 30 g on the hip can be ridden safely for very brief periods.

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PSYCHOLOGY

Average Mental Patient Has I. Q. Around 92 Points

► THE AVERAGE mental patient has an I. Q. (intelligence quotient) eight points below the normal expectancy of 100 points, Dr. Albert Rabin of the New Hampshire State Hospital at Concord, N. H., reported at the meeting of the American Association for the Advancement of Science.

Alcoholics and neurotics rated highest intellectually, epileptics and syphilitics among the lowest.

His report was based on adult intelli-

gence tests given to 1,000 state hospital patients representing consecutive admissions. In the group 21 different kinds of mental illness had been diagnosed.

These patients had had about as much school education as the general population of the United States. They did not, however, reach as high occupational levels before entering the hospital as the population of the state as a whole.

Fewer of them had been in professional and managerial work and more had been in service and unskilled occupations.

This was especially true of patients with schizophrenia, serious mental disease in which the patients seem to live almost completely in a dream world of their own. Among these patients the discrepancy was greatest between how far they went in school and the kind of jobs they had before entering the hospital. Intellectual deterioration is insidious and begins early in these patients.

Science News Letter, January 11, 1947

BACTERIOLOGY

Germes Aid Increase In Oil-Well Yields

► BACTERIA are put to work to increase oil-well yields, in a process on which U. S. patent 2,413,278 has been granted to Dr. Claude E. ZoBell, marine bacteriologist at the Scripps Institution of Oceanography, La Jolla, Calif. The patent is assigned to the American Petroleum Institute, which has dedicated it "to the public throughout the world."

The microorganism used is a comparative newcomer to bacterial science, and until now has not received a specific name. It belongs to the genus *Desulfovibrio*. It is peculiarly adapted to conditions prevailing in deep oil wells, for it thrives best in strong salt brine, likes high temperature, and cannot live in the presence of either light or air. It feeds on sulfur compounds found in oil, and apparently also on the larger molecules of the oil itself. Because of this peculiar way of life, Dr. ZoBell has named it *Desulfovibrio halohydrocarbonoclasticus*. Its action in releasing oil from the grip of rock pores and sand crevices is several-fold. It generates acid, dissolving limestone and thereby enlarging flow channels. It lowers surface tension, making the oil more free to flow. It produces carbon dioxide, thus increasing the oil-pushing gas pressure. Its action in "cracking" large molecules also makes the oil more fluid.

Science News Letter, January 11, 1947

IN SCIENCE

BIOLOGY

Parts of Mosquito Moved To New Host for Study

► MOSQUITOES served as guinea pigs in some exceedingly delicate experimental surgery performed by scientists at the Connecticut Agricultural Experiment Station. Eyes, wing-buds, beginnings of legs, and other organs were removed from young larvae, or "wigglers", and planted in the body cavities of other larvae, of pupae, and of adult insects, with almost microscopically fine glass instruments.

Object of the experiments was to find how hospitable (or otherwise) the older environments would be to the young tissues. It turned out that the older the new host insect the less well the transplanted organs grew. Hormones, or internal gland secretions, are believed to be responsible: the older the insect the more different its hormones are from those of the younger stages.

Apparently it made no difference to the growing organ that it was not in its natural position. Eyes, wings and legs grew just as well inside the body cavity as they would have had they been left where they started. The one difference was that the lens parts of the eyes turned inward instead of outward.

Science News Letter, January 11, 1947

EDUCATION

Sighted Persons Learn To Read Braille to Teach

► SIGHTED PERSONS as well as the blind are being taught to read Braille at the New York Institute for the Education of the Blind. The students with good eyesight are teachers, who must learn the system in order to correct and grade the Braille-written work of their pupils.

Latest development in teaching Braille to the sighted is the flash method, used during the war to teach servicemen how to recognize aircraft. Braille characters, instead of planes, are flashed on the screen here.

The final test of the sighted teachers in their course is reading by touch. For the final examination, they are required to read in darkened classroom.

Science News Letter, January 11, 1947

SCIENCE FIELDS

CHEMISTRY

Cleaning Compound Frees Aluminum from Oxide

► **CLEANING** composition for removing oxide films from aluminum and aluminum alloys contains ammonium silico-fluoride and sodium acid sulfate. It has enough ammonium sulfate to prevent the formation of a precipitate in water solutions of the cleaner. The patent, 2,413,365, was awarded to Lowell R. McCoy, Detroit, and is assigned to Wyandotte Chemicals Corp., Wyandotte, Mich.

Science News Letter, January 11, 1947

CHEMISTRY-PLANT PHYSIOLOGY

Gas-Mask Means May Save Apples in Storage

► **GAS-MASKS** of World War I vintage have contributed an idea that may be the means of saving apples in storage from ripening too rapidly.

Most important single item in the gas-mask canister was activated coconut-shell charcoal, whose myriad minute crevices offered a great internal area on which the molecules of the poison gases were adsorbed. Prof. R. M. Smock of Cornell University uses the same basic idea in apple storage houses, drawing the air through canisters of coconut-shell charcoal with suction fans to remove the ethylene gas that stimulates apples to premature ripening. There is no way of preventing ethylene from getting into places where apples are stored, for the apples themselves generate it in the ripening process. If a few apples start ripening up, the ethylene they give off starts others, until finally the whole warehouseful of apples may be in a mad chemical race toward precocious maturity. This premature ripening in storage is usually accompanied by widespread occurrence of scald, one of the worst types of apple spoilage.

As soon as Prof. Smock's method can be placed on a full-scale commercial basis it should result in large savings to apple growers and handlers, and longer continuance of apples in the market in spring. Cost of de-ethylenizing of storage-house air is reckoned at about one-half cent per bushel.

Science News Letter, January 11, 1947

HISTOLOGY

Specimens Shine in Dark With "Shining Stains"

► **SPECIMENS** intended for examination under the microscope may now be chemically treated so that they will shine in the dark, in addition to the time-tried practice of using colored stains visible only in the light. At a demonstration before the American Association for the Advancement of Science, Prof. Charles T. Brues and Dr. Ruth C. Dunn of Harvard University showed how the new method brings out certain details in insect body structure.

The "shining stains" are fluorescent compounds that give off visible light, usually yellow, when exposed to invisible ultraviolet radiation. Most of the compounds come from the roots of plants, especially certain members of the poppy family.

Science News Letter, January 11, 1947

ENTOMOLOGY

Gammexane-Dosed Animals May Help Control Pests

► **BEDBUGS**, mosquitoes, ticks and other blood-sucking pests may in future be controlled by feeding an insecticide, such as gammexane, to animals. The insects would then get their poison dose from the blood they sucked when feeding on an animal.

Success in preliminary trials of this super-Borgia scheme for controlling insects is reported by Dr. Botha De Meillon, entomologist of the South African Institute for Medical Research.

He mixed powdered gammexane, which is a super-DDT, with agar and let this jelly-like material set. It was cut in cubes and one cube fed to a rabbit every morning. Bedbugs in all stages fed fully on the rabbit and showed signs of paralysis immediately after. Not all died, but in his report to *Nature*, Dr. De Meillon states:

"A colony of bedbugs would have little chance of surviving many generations if they feed continuously on a gammexane rabbit."

Yellow-fever mosquitoes fed fully and became paralyzed. All fully fed females died within 24 hours.

Ticks apparently noticed that something was wrong because they did not feed fully on the rabbit with gammexane in its blood. They showed obvious signs of distress which persisted for days;

within 10 days all the ticks in the experiment were dead.

Whether animals would be poisoned by feeding continuously on gammexane has not yet been determined. If they are not, or if some other chemical that kills insects but is safe for animals is developed, the method should prove valuable for controlling blood-sucking insects. Dr. De Meillon points out that it would have great possibilities in the veterinary sphere.

Science News Letter, January 11, 1947

EDUCATION

Children Seen, Not Heard To Learn Silent Reading

► **THE OLD IDEA** that children should be seen, not heard, seems to apply to learning to read.

Prof. G. T. Buswell of the University of Chicago told the psychology section of the American Association for the Advancement of Science that schools should use silent reading methods rather than oral because reading is a matter of thinking and seeing, not saying words.

If you read slowly, Prof. Buswell might find that you are a "sub-vocalizer" who reads noiselessly but not silently. He reported tests with a group of adults who complained of a slow reading rate.

Pointing out that a striking number of the cases showed a rate very close to the individual's oral rate of reading, Prof. Buswell said, "The fact was that they were sub-vocalizers—the victims of a method of teaching reading that fixed oral-reading habits first and so strongly that the later silent reading was only noiseless reading, showing none of the characteristics common to effective silent reading."

In a reading clinic where they were forced to read faster than they could say the words they read, the group averaged a 60% gain in rate of reading without loss of comprehension.

The average rate of reading, according to Prof. Buswell, is 300 words per minute for non-fiction material at the end of the program of instruction in the schools, but rates of 600 to 800 words per minute may be reached.

Where the number of words per minute is as low as 150, not uncommon in both high school and college, the variation has been found roughly proportional to the amount of sub-vocalization present.

Science News Letter, January 11, 1947

AERONAUTICS

Safe Landing in Ceiling Zero

Radio, radar, fog dispersal and lighting make modern flying safer. Problem is not to stay in air in rough weather but to avoid collisions and land safely.

By A. C. MONAHAN

See Front Cover

► MODERN planes can fly through clouds, overcast and many storms; they fly with safety if no hidden mountain peak or towering building is in their path. The great problem is not keeping in the air in overcast weather; it is in avoiding collisions and making safe landings.

All-weather flying may be expected in the near future. Landing in overcast and avoiding obstacles in flight are, perhaps, the two major problems confronting aviation today. They are related problems, and much has already been accomplished to solve both. The hazard of invisibility in aviation, it may be said, is rapidly being overcome.

Several Systems Used

Experts seem to agree that there is no single type of equipment or landing system now known that will meet all conditions. Radar, high-frequency radio, glide beams, radio markers, runway lighting, and fog dispersal by heating and cloud dispersal by freezing, may all play a part. But none of these by itself appears to be sufficient. Even the Civil Aeronautics Administration's three-element instrument landing system seems inadequate in many situations.

Whatever landing system is finally adopted, it must become universal in use. All airports for commercial transports must be similarly equipped. Special apparatus on planes must be provided. The total cost will be great, and both ports and planes are justified in delaying installations until an agreement has been reached and the government aviation authorities have made a final decision.

Radar was hailed during the war as the cure-all for the hazards of civilian air transportation. It is not, at least not in the present stage of development. Radar played a part in winning the war, the value of which can not be over-emphasized. In aviation, it saved hundreds of American lives, and brought destruction

to thousands of enemies and great masses of enemy installations.

War-developed radar equipment, however, was bulky, requiring considerable space and special crew members to operate. Transports hesitate to install equipment whose weight and space requirements decrease payload capacity. They question using apparatus requiring specially-trained personnel.

The first wide use of radar in commercial and private aviation will probably be installed in planes for the detection of objects ahead in order to avoid collisions. While the number of disastrous accidents in commercial transportation is small in proportion to the number of flights, most of them have been collisions in low visibility with mountain peaks and steep rising cliffs.

New light-weight radar sets have been developed for commercial planes and are being experimentally tested in the air. Still lighter sets for private planes have also been developed. Mountain collisions should soon be a thing of the past. It is a question, however, whether or not these radar sets would be of much help to a low-flying plane over New York, with the Empire Building ahead.

War-developed radar, the so-called ground control approach apparatus (GCA), is hailed by many as a complete solution to the problem of making safe landings in overcast. Others disagree. It was used widely and successfully in the last years of the war by the Army and Navy, and is still being used. It is being installed at a number of commercial airports by the U. S. Civil Aeronautics Administration to supplement its so-called three-element instrument landing system. Also, new GCA apparatus is now available which is much simpler to use than the earlier equipment.

Bulky Equipment

This ground control approach system, however, still requires bulky, expensive equipment installed either on the landing field or in the control tower. A constantly rotating antenna picks up on its scope any approaching plane within some 30 miles, locates its position and follows it in flight. Radar also shows the operators of the equipment the landing runway.

The pilot is directed into position for approach and landing by radio instructions from the radar operators. The plane needs no special equipment except its radio receiver. When it is within some 50 feet or so of the ground, where the pilot can see the lighted runway, he takes



RADAR ON WHEELS—Mobile radar Ground Control Approach units, such as this used by the Army Air Forces, are being installed in commercial airports.

over and makes the actual landing on his own.

The CAA three-element instrument landing system is not radar. It includes a radio signal called a localizer which is picked up by a pilot when some 15 miles from an airport and used as a guide along a straight path to the center of the runway. Also it includes a radio beam glide path which guides him down a safe angle to the surface. The third element consists of two or more radio beacons with fanlike beams, projected vertically, which inform him of his nearness to the field.

It is an automatic radio aid, giving ground-to-plane transmissions which indicate, through panel instruments, the location of the plane along the radio approach beam. A panel instrument in the plane guides the pilot's approach by two needles working on the same dial, one showing if he is headed in the right direction, the other if he is following the glide path downward.

Automatic Pilot

A new electronic device, an automatic pilot developed by the Sperry Gyroscope company, may be used to keep the ship on the glide path. It does not replace the human pilot, however; he is needed to set the device to receive the localized radio signals. When receiving properly, it guides the plane along the beam.

One important development in air-plane guidance for landing, communication and following the beam along airways is the increasing use of very-high frequency transmitters and receivers. Ordinary radio is subject to blackouts during electrical and other storms, the time when most needed. The very high-frequency, VHF for short, is practically static-free. Planes require special receivers. Many of the larger airports now have VHF for planes properly equipped, and ordinary radio communication for others not yet converted.

On cross-country flights, commercial planes, as a safety measure, follow well-defined airways marked by beacons for night flying, or beamed by radio and known as radio ranges. Although these beacon lights are still important for many users, more and more the trend is to radio ranges.

Basically, radio ranges consist of radio transmitters, at 200-mile intervals if low-frequency is used, which alternately transmit two interlocking signal patterns in Morse code. When a pilot is directly on a range course, the two signals merge



EASING IN—Glide path landing is visualized by an artist of Federal Airways Service.

in a steady tone. By the tone he knows whether or not he is on the range. Other signals from the transmitter identify the particular station.

Low-frequency radio ranges are now being replaced with very high frequency because of its higher reliability. One range using VHF has been in use experimentally for nearly a year, and nine others are now under conversion.

Effective Lighting

Regardless of radio and radar approach systems for planes, a pilot needs to actually see the runway before landing. Ordinary runway lighting systems are satisfactory for night landings in clear weather, and for day or night landings in light fogs. In heavy fogs, more is needed. Much attention, therefore, is being directed toward more effective lighting. The answer seems to be in the use of high intensity approach and runway lights.

In one tryout, the runway is lined by lights of 30,000 candle-power with five degrees of intensity. The intensity is controlled by the tower operator so that lights may be brightened or dimmed to meet the needs of the pilot or the demands of the weather.

Dispersing a heavy fog on airport runways may sound fantastic, but it has repeatedly been done. During the war in England, where fogs are really heavy, a method called "Fido" was developed. Planes can land safely under zero ceilings when Fido, pictured on the cover

of this SCIENCE NEWS LETTER, burns away fog from runways. Gasoline was burned in long troughs along the edges of the runway. The heat produced was sufficient to disperse the fog long enough for a plane to land.

Later, the system was improved both in England and America. Either gasoline or fuel oil are used today. One method uses pipelines through which the gasoline or other fuel is forced to jets where it is ignited by remote control from the airport tower. This is a more economical method because it is

(See Page 28)

YOUR HAIR AND ITS CARE

By Oscar L. Levin, M.D.
and Howard T. Behrman, M.D.

NEW, REVISED, EXPANDED EDITION—JUST OUT!
If you want healthy hair, lovely hair, then you need the expert advice in this book.

Two medical specialists have here pooled their knowledge to give you in plain language the up-to-date scientific facts now available about hair. They tell you what to do to save and beautify your hair, stimulate healthier hair growth, and deal with many problems, common and uncommon, as:

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Do You Know?

Sulfate *turpentine* is obtained from the crude waste liquor of paper mills.

Stained glass, which is chemically colored ordinary glass, has been used for over 16 centuries.

Speculum is an alloy plated electrolytically on household utensils to give a highly reflective finish; it is 45% tin and 55% copper.

The carotene content of *kale* is 50% or so more than that of carrots; carotene is the yellow-orange pigment which the body converts into vitamin A.

Nearly 100 Canadian vessels on the two coasts, the St. Lawrence and the Great Lakes, have been equipped with surplus *radar* developed for use on motor torpedo boats and patrol vessels.

Metal salts of ethylhexoic acid are superior paint and varnish driers with inoffensive odors.



Photo courtesy Haverford College

RESISTANCE BOXES FOR STUDENT USE

L&N instruments like those shown above take long and hard use by physics students in their experiments. The resistance boxes are made in 2-, 3- and 4-dial instruments with enclosed switches, and can be used in d-c or low-frequency a-c measurements. D-C resistant change from zero setting, measured across binding posts, equals readings $\pm(0.1\% + 0.01 \text{ ohm})$.

The Adjustable Mica Capacitor has a total capacitance of 1 μf in 5 sections: 0.5, 0.2, 0.2, 0.05, 0.05 μf . Limit of error is $\pm 0.25\%$.

Further information on request.

LEEDS & NORTHRUP
Jrl. Ad EB43(2b)

From Page 27

under better control and requires less fuel.

Heavy clouds at low temperatures above airports or on approach paths may someday be converted into snow by particles of dry-ice, or solid carbon dioxide, spread within it by aircraft. This actually has now been done. The cloud

must be of the type known as a supercooled cloud; that is, it must have a temperature well down towards zero Fahrenheit. Such supercooled clouds hold water droplets that are not frozen in spite of the below-freezing temperature. The dry-ice converts the droplets into snow, that slowly falls earthward, clearing the air.

Science News Letter, January 11, 1947

ELECTRONICS

Motion Picture Innovations

Magnetic recording of sound on motion picture films may replace other methods. Wire, paper disks, or tape are coated with magnetic material.

► MAGNETIC recording of sound, voices and music accompanying motion pictures promises to replace older methods in the motion picture industry, judging from scientific discussions of the subject at the meeting of the Society of Motion Picture Engineers in Hollywood.

Magnetic recording of the voice on wire, tape or paper disks coated with a magnetic material has come into wide usage in the past few years in the phonograph industry. The sound waves operate a mechanism that magnetizes the moving wire, tape or disk with intensities varying with those of the sound. When played back, the amount of varying magnetism on the record produces variations in the vibration of a diaphragm that reproduces the sound waves. One advantage of the method is that a record can be wiped off by use of a magnet.

A magnetic sound track on motion picture film is convenient and economical, Marvin Camras, of the Armour Research Foundation, Chicago, stated. The final recording can be monitored while being made and requires no processing. All or part of the record can be erased and a new record put on or edited in the usual manner.

Recent developments in magnetic recording have led to practical use of this art as a high-fidelity recording system, R. J. Tinkham and J. S. Boyers, Magnecord, Inc., Chicago, declared. They described a wire recording equipment characterized by good frequency response, low distortion and flutter.

New magnetic recording media, which will widen materially the field of application of the art, were presented earlier by Dr. S. J. Begun, Brush Development

Co., Cleveland. Probably most outstanding among them, he said, is the non-ferrous wire or tape; plated with a thin layer of nickel-cobalt alloy, and the paper disks and tapes coated with a dispersion of magnetic powder.

The magnetic characteristics of the coated and plated materials are such that it is possible to obtain good frequency response with relatively low speed of the recording medium.

Science News Letter, January 11, 1947

SAFETY

Colder Weather Makes Faster Braking on Ice

► YOU CAN STOP your car in a shorter distance on smooth ice when the temperature is 10 degrees Fahrenheit than when the temperature is up to 32 degrees. If your tires are made of natural rubber instead of the synthetic product, your car will have a shorter braking distance, too, tests conducted last winter by the National Safety Council showed.

Measuring the distance it took to stop a car on ice, investigators found that the braking distance declined as the temperature fell below freezing. Without chains, the distance was consistently shorter for cars with natural rubber tires. But at freezing when chains were put on the rear tires, the car with synthetic rubber tires was found to stop sooner. At a lower temperature, this was reversed and natural-rubber-tired cars came to a stop faster.

At freezing temperature, 32 degrees Fahrenheit, a car with bare tires of natural rubber stops in 193 feet on smooth ice, and a car with synthetic rubber tires in 225 feet.

Science News Letter, January 11, 1947



No moisture can seep through the seams of these raincoats—thanks to the electronic sewing machine developed at RCA Laboratories.

A sewing machine...without a needle or thread!

Since mankind first began to sew, say 15,000 years ago, seams have always meant "needle and thread."

But when new thermoplastic materials came along—specially developed for waterproof coverings such as raincoats—ordinary "needle and thread" seams wouldn't do because of their tiny holes.

Now—thanks to research at RCA Laboratories—goods made of thermoplastics are "sewn" by electrons and the seams are as strong as the material itself!

This will make possible dozens of brand-new uses for these inexpensive and durable thermoplastic materials. Even today they provide perfect packages for foods, meats

and drugs because they are completely watertight, airtight and transparent. You've probably seen thermoplastic raincoats, tobacco pouches, shower curtains...

Research, such as resulted in the electronic sewing machine, is reflected in all RCA products. When you buy an RCA Victor radio or television receiver or anything bearing the name RCA, you enjoy a unique pride of ownership in knowing that you possess one of the finest instruments of its kind that science has yet achieved.

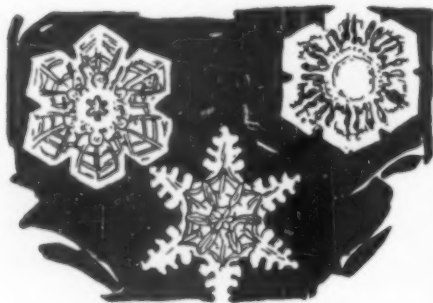
Radio Corporation of America, RCA Building, Radio City, New York 20 . . . Listen to The RCA Victor Show, Sundays, 2:00 P. M., Eastern Time, over the NBC Network.



The electronic sewing machine "welds" seams in thermoplastic materials. Anyone interested in manufacturing this instrument can obtain information by simply writing to RCA, RCA Building, Radio City, New York 20, N. Y.



RADIO CORPORATION of AMERICA



Fragile Individualists

► SNOW CRYSTALS by billions have fallen from gray skies through all the millions of winters this old earth has seen. Yet it is most probable that no two in all those countless hosts have ever been exactly alike. Certainly no two snowflakes in the many thousands that have been examined by scientists have ever been identical.

There is, indeed, easy enough chance for infinite variety in the manner in which snow crystals are formed. They start as raindrops start, with the attachment of water molecules to electrically charged nuclei in the clouds. These nuclei may be almost any kind of particle—microscopic grains of dust, minute salt crystals; anything, in short, that can accumulate an electric charge. They differ from forming raindrops, of course, in that the change is from water vapor to the solid, or ice, phase rather than to liquid.

Basic crystal pattern of solidifying water is a hexagonal plate. The first few molecules electrically seized by the nuclei presumably arrange themselves in a six-sided pattern. But water molecules are exceedingly minute, and by the time some hundreds of millions of them have assembled to form even a little snow crystal the interplay of forces in even that small frame of action can have worked out a pattern that has never existed before.

There are, however, certain family resemblances among snow crystals, which you undoubtedly have noticed even if

your study has been no more ambitious than a casual glance at the bits of white that fall on your coat. Some of the fragile jewels of the snow are exceedingly intricate and lacy in outline, others are of a more severely simple pattern, still others are intermediate in the elaborateness of their structure. Very rarely are two classes of crystals seen during the same snowstorm.

Meteorologists say that the delicate filagree patterns are formed in low-hanging clouds where relative humidity is high and temperatures not far below freezing. The smaller, more severely simple crystals are formed at greater heights where temperatures are much lower but where there is less free moisture. You may recall from your own experience how these Spartan patterns are seen as a rule during the coldest snowstorms, when some share of the cold aloft is also felt down at ground level.

Science News Letter, January 11, 1947

TEXTILES

Chemicals Protect Textiles From Mildew and Mold

► YOU CAN TAKE your choice of a variety of chemicals to protect household draperies, shower curtains and awnings from mildew and mold. The information is available from the Office of Technical Services, Department of Commerce.

Numerous chemicals were found to be effective in preventing deterioration of textiles over a wide range of tropical conditions. They include copper 8-hydroxy quinoline, pyridyl mercuric stearate and chloride, copper naphthenate, and copper ammonium fluoride.

Experiments with over 15,000 samples of textiles and other materials were conducted at a test station in the Canal Zone. Over 4,500 living fungus cultures and 1,100 bacteria samples were assembled for the tests.

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ASTRONOMY

Eclipse Tells of Stars

Existence of sun's corona revealed through total eclipse. Eclipse of double stars shows their size, shape and temperature.

► ECLIPSES of the sun and the stars tell us much about these heavenly bodies that would otherwise escape our attention. Dr. Henry Norris Russell, Princeton University astronomer, stressed in the first of a series of lectures to be given annually and named after him. Dr. Russell spoke at the annual meeting of the American Astronomical Society, meeting in Cambridge with the American Association for the Advancement of Science.

Total eclipses of the sun made us aware of the existence of the sun's corona, Dr. Russell pointed out. Double stars that revolve in or nearly in a plane along our line of sight are among the most important and best-known. Changes in their light and spectra during periodic eclipses furnish many clues to their sizes, shapes, temperatures, rotations and nearness together. Some of these eclipsing stars are so close together they are practically in contact and have an hour-glass shape.

Contributions for the Henry Norris Russell lecture fund were made by nearly 300 individuals and organizations in recognition of the leading part Dr. Russell has played in the advance of science

for the past half century. He has served as synthesizer of theories and observations in all phases of astronomy; lately he has acted as the world's outstanding critic of new theories.

Dwarfish stars like our sun, waltzing through space in well-mated pairs and sometimes dancing cheek-to-cheek, are the most common type of eclipsing stars.

Such close pairs of sun-like stars are at least 25 times as numerous per volume of space as eclipsing binaries of all other kinds, Dr. Harlow Shapley of Harvard Observatory told the meeting. Their relative frequency in the star population, at least in this part of galactic systems, is much higher than that of other types of eclipsing stars.

The fact that low-luminosity yellowish eclipsing systems of the W Ursae Majoris type are so numerous is important in unraveling the mystery of how double stars come into being. It suggests a distinct genetic difference between these close ellipsoidal pairs which are frequently in superficial contact, and the more commonly studied eclipsing pairs of unequal components and great spectral variety.

Some caution must be exercised in estimating their frequency per unit space, Dr. Shapley warned, because there is a faint possibility that some such variables may belong to a certain subgroup of cluster-type variables that have similar periods and light curves. The groups may eventually be segregated by careful study of their color-indices: the sun-like variables are considerably redder as a class than Cepheid stars that have frequent variations in brightness.

Double stars that are close together are often freaks.

While the masses of the heavier components of close binary systems are approximately normal for their spectral characteristics, Dr. Otto Struve of the Yerkes and McDonald Observatories stated, when the pairs are close together

they are abnormally small in size. The secondary components as a rule not only are abnormally large, but sometimes they have an abnormal mass and luminosity.

The mass of one star of an eclipsing system may be five, ten, 20 times as great as that of its companion, or it may be even more, Dr. Struve said in reporting on the work carried on during the past three years by University of Chicago astronomers at the McDonald Observatory of the University of Texas. In all double stars they found that the stars rotate in the same direction as that in which they move their orbits.

By determining the physical characteristics of close double stars, the astronomers hope to throw new light upon the old problem of the origin and evolution of eclipsing binaries.

Science News Letter, January 11, 1947

Books of the Week

ANALYTICAL GEOMETRY AND CALCULUS—Henry B. Phillips—Addison-Wesley, 457 p., illus., \$6. A text which provides a course in analytical geometry and calculus for students of science and engineering.

AUDIO-VISUAL METHODS IN TEACHING—Edgar Dale—Dryden, 546 p., illus., \$4.25. This volume has been planned as a textbook and as a tool for teachers-in-service. It discusses the "Why", "What" and the "How" of audio-visual materials.

BIBLIOGRAPHY ON CORK OAK—Compiled by R. C. Watrous and H. V. Barnes—Govt. Printing Office, 66 p., 15 cents. U. S. Dept. of Agri. Bibliographical Bul. No. 7, April 1946.

COSMIC RADIATION—W. Heisenberg, Ed.—Dove, 192 p., illus., \$3.50. Fifteen articles on recent accomplishments in this field, written by German physicists during World War II.

CROW SHOOTING—Bert Popowski—Barnes, 216 p., illus., \$2.50. A book that tells about the habits and idiosyncrasies of the crow and gives expert detail on how to hunt him.

FUNCTIONAL ANATOMY OF THE MAMMAL: A Guide to the Dissection of the Cat and an Introduction to the Structural and Functional Relationship Between the Cat and Man—W. J. Leach—McGraw-Hill, 231 p., illus., \$2.50. Emphasizes structural similarities and differences between the cat and man.

MANUAL OF ELECTROENCEPHALOGRAPHY FOR TECHNICIANS—Robert S. Ogilvie—Addison-Wesley, 100 p., illus., \$5. A work book covering the techniques and operational phases of modern electroencephalography. It is of particular value to neurologists and psychiatrists.

THE PATH OF SCIENCE—C. E. Kenneth Mees—Wiley, 250 p., \$3. A book which deals with the growth of science through the ages and its relations to society today.

THE PUMA: Mysterious American Cat—Edward Goldman—American Wildlife Institute, 358 p., illus., \$4. A monographic

plishments of George Westinghouse. Westinghouse Centennial Series, Vol. III.

SCIENCE SINCE 1500: A Short History of Mathematics, Physics, Biology—H. T. Pledge—Philosophical Library, 357 p., illus., \$5. A survey of the growth of modern science during the last 4 centuries.

WOOD YEAST FOR ANIMAL FEED—Northeastern Wood Utilization Council, 198 p., \$2. Bul. No. 12, Nov. 1946.

Science News Letter, January 11, 1947

HEALTH

Eat Less to Live Longer and To Escape Some Diseases

► **EAT LESS** and you will live longer and perhaps escape cancer and chronic diseases of lungs and kidneys. You will, that is, if man's body and organs respond to calorie-restricted diets as do rats.

Warnings against the dangers of overeating and overweight were given by two nutrition authorities at the American Public Health Association meeting.

Rats lived much longer if during their growing period they were kept on diets adequate in known essentials, such as minerals, vitamins and proteins, but restricted in calories, Dr. C. M. McCay, Cornell University professor, reported.

The longer life span for the rats was due in part to slower development of chronic diseases in the lungs of rats whose growth was retarded by diets low in energy value. Such diets and the slower growth also lead to a much lower occurrence of tumors and possibly to less aging of special organs such as the kidney and lungs.

The major nutritional problem of the United States, from the public health viewpoint, is the disregard of the impairment to health that comes from overeating, Dr. Frederick J. Stare of Harvard declared.

The people should be warned of the danger of overweight, he stated.

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☼ **FIRE BLANKETS**, for emergencies in factories, laboratories and homes, can be used to smother flame. They are made of strong glass cloth, impregnated on both sides with synthetic rubber.

Science News Letter, January 11, 1947

☼ **FLOW METER** accurately measures the air flow through an automobile engine that gives the necessary crank-case ventilation and removes gases escaping past piston rings. Used under actual operating conditions, it measures both the flow of air entering the engine and the total outlet flow.

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☼ **GAS COLLECTOR**, used in an automobile plant to prevent exhaust gases from escaping into the air while engines in assembled cars are being tuned, is a scoop that rises automatically from the floor to cover the exhaust pipe. An electric eye actuates a mechanism that raises the scoop and draws the gases away.

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☼ **SALT AND PEPPER shakers** drop a measured amount of the seasoning each time the top is pressed. Non-clogging in damp weather, they are made of a plastic that has enough heat-resistance for them to be put on top of a stove without injury.

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☼ **SELF-SERVICE** booths in a music store, where records may be tried with-



out disturbing other people, are open stalls with ordinary phonograph disks for the records and telephone receivers for the listeners. Only one person hears the record with the arrangement shown in the picture.

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☼ **EYE-TESTER**, for visual performance only, determines individual sight characteristics. These include depth and sharpness of visual perception, eye muscle balances, and color. In the device are used a series of checkerboards, lines crossing a flight of stairs, arrows pointing to numbered dots and colored circles.

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☼ **WIRE NAIL**, with parallel grooves cut around its shank, holds like a screw in railroad car and truck bodies under severe vibrations on the road. These sharp holding grooves are set at angles so that they do not disrupt the fibers of the wood when driven in.

Science News Letter, January 11, 1947

☼ **DISPLAY** compartment, attachable to the rear side of an automobile visor, makes it possible to keep a road map or reminder list in constant view of the driver. The map or list is held flat by a transparent plastic front that also protects it from dust.

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If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 344. To receive this Gadget Bulletin without special request each week, remit \$1.50 for one year's subscription.

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